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SECOND ANNUAL REPORT

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OF THE

COMMISSIONER

OF

PUBLIC ROADS

For the Year Ending October 31st,

1895.

TRENTON, N. J.:
MacCrellish & Quigley, Book and Job Printers.
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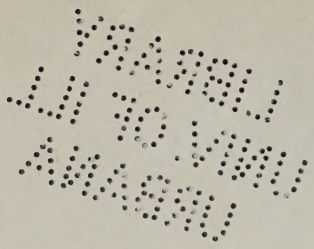

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OFFICE OF COMMISSIONER OF PUBLIC ROADS,
TRENTON, N. J., November 29th, 1895.

To the Governor and Legislature of New Jersey:

I have the honor of presenting the following report of roads constructed under the operations of the State Aid Law for the fiscal year ending October 31st, 1895, with such suggestions as the experience of the year has demonstrated would be proper for adoption.

HENRY I. BUDD,
Commissioner of Public Roads.

16471

REPORT.

The Act of May 16th, 1894, providing for the appointment of a State Commissioner of Public Roads and to define his duties, requires said Commissioner to report to the Legislature what roads were constructed with State aid for the year ending on the next preceding thirty-first day of December, and the amount of their cost, and in general the operations of his office for said year.

The Act of June 15th, 1895, requires that all Boards, Commissions, State officials and other persons required by law to present an annual report to the Governor or to the Legislature shall make report as of the thirty-first day of October annually, and shall present the same in writing to the Governor on or before the thirtieth day of November. And that all acts and parts of acts inconsistent with this act be and the same are hereby repealed.

In compliance with this latter act, we make the following report of such roads as have presented their statements of cost on or before October 31st, 1895.

Having been appointed Commissioner of Public Roads, by his Excellency, Governor George T. Werts, on the twenty-first day of May of this year, I immediately proceeded to take up the work from which my able predecessor had been by death so suddenly called.

When I assumed the duties of the office, I found Mr. Burrough had approved the following named roads, and the work of construction was well under way :

BURLINGTON COUNTY.

Evesboro and Cross roads	5¼	miles.
Cross roads and Vincentown	4½	"

CAMDEN COUNTY.

Collings road	1¼	"
Heading or Browning Lane road	1½	"
Kirkwood and Berlin road	5½	"

ESSEX COUNTY.

Mt. Pleasant avenue turnpike	$2\frac{3}{4}$	miles.
Pumpton road	$3\frac{3}{4}$	"

GLOUCESTER COUNTY.

Swedesboro road	$1\frac{1}{4}$	"
Crown Point road	$6\frac{1}{2}$	"

MIDDLESEX COUNTY.

Perth Amboy and Woodbridge road	$5\frac{7}{8}$	"
Pumptown, Holly Corner and Oak Tree	$1\frac{3}{4}$	"

MERCER COUNTY.

Ewingville road	$3\frac{33}{100}$	"
Milford or Etra road	$1\frac{57}{100}$	"
Greenwood avenue	$1\frac{1}{2}$	"
Total	$46\frac{11}{40}$	miles.

The following roads have been completed and will claim their share of the State's appropriation for the fiscal year ending the 31st day of October, 1895:

BURLINGTON COUNTY.

Evesboro and Cross roads	$5\frac{1}{4}$	miles
Cost	$34,720 83	
State's share	11,573 61	
Cross roads and Vincentown	$4\frac{1}{2}$	miles
Cost	$24,779 01	
State's share	8,259 67	

CAMDEN COUNTY.

Collings road	$1\frac{1}{4}$	miles
Cost	$8,294 52	
State's share	2,764 84	
Heading or Browning's Lane road	$1\frac{1}{2}$	miles
Cost	$12,466 68	
State's share	4,155 56	
Kirkwood and Berlin road	$5\frac{1}{2}$	miles
Cost	$25,574 58	
State's share	8,524 86	

ESSEX COUNTY.

Mt. Pleasant Avenue Turnpike	$2\frac{3}{4}$ miles
Cost	$28,138 11
State's share	9,379 37
Pompton road	$3\frac{3}{4}$ miles
Cost	$28,575 18
State's share	9,525 06

GLOUCESTER COUNTY.

Swedesboro road	$1\frac{1}{4}$ miles
Cost	$8,708 10
State's share	2,902 70
Crown Point road	$6\frac{1}{2}$ miles
Cost	$31,160 13
State's share	10,386 71

MIDDLESEX COUNTY.

Perth Amboy and Woodbridge road	$5\frac{7}{8}$ miles
Cost	$30,564 48
State's share	10,188 16
Pumptown, Holly Corner and Oak Tree road	$1\frac{3}{4}$ miles
Cost	$9,587 37
State's share	3,195 79

MERCER COUNTY.

Ewingville road	$3\frac{33}{100}$ miles
Cost	$27,172 41
State's share	9,057 47
Milford or Etra road	$1\frac{57}{100}$ miles
Cost	$14,190 66
State's share	4,730 22
Greenwood Avenue road	$1\frac{1}{2}$ miles
Cost	$16,067 94
State's share	5,355 98
Total cost to the State	$100,000 00
Appropriation	100,000 00

Total cost of roads to both State and county are given further on in the more detailed statements of engineers and supervisors. The following roads have been approved and are being placed under contract for construction under the State appropriation for the fiscal year beginning November 1st, 1895, and ending October 31st, 1896:

BURLINGTON COUNTY.

Mount Holly and Pemberton road	5.79	miles
Bridgeboro and Burlington road	$3\frac{1}{2}$	"
Palmyra and West Palmyra road	$\frac{3}{5}$	"

ESSEX COUNTY.

Northfield road	$2\frac{1}{2}$	"
Northfield Church to Budd's Lane Bridge	$3\frac{1}{2}$	"

GLOUCESTER COUNTY.

Westville and Glassboro road	6	"

MIDDLESEX COUNTY.

Dunellen and Stelton road	6	"
Spotswood and Old Bridge road	3	"

MERCER COUNTY.

Pennington and Hopewell road	$4\frac{1}{2}$	"
Lawrenceville and Princeton road	$4\frac{3}{4}$	"
Mercerville and Edinburg road	$4\frac{3}{100}$	"

MORRIS COUNTY.

Millington and Williams Corner road	$2\frac{1}{2}$	"

PASSAIC COUNTY.

Echo Lake road	$2\frac{46}{100}$	"
Total	$49\frac{12}{100}$	miles

Since my incumbency I have frequently been over the roads under construction, and have generally found the specifications well adhered to. The supervisors and engineers have been mostly faithful to their duties, and the contractors seemed anxious to carefully carry out their contracts. The result for the year has been $46\frac{11}{100}$ miles of well-constructed highways.

Following are some remarks on maintenance, width of road-bed, oyster-shell and gravel, additional legislation and suggestions, the result of experience and observation.

MAINTENANCE.

The four months of almost continued absence of rainfall has been very trying to all kinds of roads. The sand roads became almost impassable with their unusual depth of sand. The gravel and dirt roads dissolved into dust and chuck-holes, and the stone roads manifested a strong tendency to disintegrate on the surface for the want of moisture to cement the binding material with the stones. In many cases this tendency was overcome by a slight top-dressing of loamy gravel, in others by the application of water. Perhaps the most practical and economical plan is: in the late spring to apply thin coatings of gravel possessing cementing qualities, beds of which are found in a few localities in the southern part of the State, not far from where most needed. Noticing that where a certain amount of moisture was mostly present, through a damp subsoil, under the shade of trees, or where municipalities or incorporated stone pikes have daily recourse to the sprinkler, there was little or no raveling, I became impressed that water is a most potent element for preserving the integrity of the road-beds, so have urged upon all the county boards, where it could economically be done, the application of the needed moisture.

I have also noticed, where the surface of the stone roads was a part of shaded avenues, there was little or no disintegrating, thus emphasizing the experience and practice of European road-builders that macadamized roads should be set with shade or fruit trees, thus employing the silent forces of nature to steadily provide what would require considerable outlay on the part of our freeholders, besides adding beauty to the landscape and pleasure and comfort to the traveler.

Another necessary provision for their maintenance is the quick adoption of measures whereby loaded wagons will be required to use tires not less than four inches wide. Narrow tires are the most fruitful source of cutting and rutting the surface of stone roads, whereas, if broad tires were the rule the traffic would continually roll and consolidate the bed. To accentuate this we will print in the back of this report our laws relating to wide tires.

WIDTH OF ROAD-BED.

My predecessor was anxious to extend the stone-road system over as many miles as possible, so as to give all sections the benefit of firm roads for their heavy traffic. In order to do this he confined his approval to those principally ten and not more than twelve feet wide. The first in practice has proven too narrow. The tear of horses' feet is in one and the same path, and the wheels run in one and the same tread, thus, instead of spreading the traffic over the whole surface, sunken paths and ruts are formed, which are catchments for moisture, softening the bed and requiring frequent additions of material to keep it properly rounded. To avoid this the specifications so far approved for the coming year's construction have been for fourteen and sixteen feet wide pavements, experience having taught that their maintenance would be much more economical, as there would be room for the traffic to spread over a greater surface and thus have a compacting instead of disintegrating tendency, besides allowing loaded teams to pass without crowding from the improved bed. This decision does not, in some counties, increase the cost, as a thinner coat of metal is used; six to eight inches of thickness seeming to serve for years as good a purpose as ten to twelve inches.

ADDITIONAL APPROPRIATION.

The demand for stone roads is *decidedly* on the increase, especially in sections where they have been partially enjoying their benefits. To construct all that are applied for and accepted by the different boards of freeholders will, under the present appropriation, require many years.

Counties that have been slow in accepting the provisions of the State Aid law are now anxious to avail themselves of it, with the result that the present year's appropriation is being spread out very thin, leaving the sections that are in the full spirit of improvement with opportunity for only a small mileage each year. Therefore they are urging that a healthy development of the system demands an increase of the amount of the State appropriation. The roads applied for and waiting State aid, besides those that have been approved, amount in the aggregate to about one hundred and thirty miles, and

will require several years before the present yearly appropriation will reach them.

Fifty miles of road-bed per year is the extreme limit the present appropriation ($100,000) will assist in building.

Five counties have in the past been the principal beneficiaries of the act, allowing each the improvement of an average of about ten miles.

Now fourteen counties are receiving and preparing to take advantage of the bounty, thus limiting the improvement in each county to an average of only about three and one-half miles per year.

When the whole number—twenty-one counties of the State—are awakened to the necessity of good roads, as they no doubt soon will be, the progress of each will be limited by the present appropriation to less than two and a half miles per year, a rate of progress that will be pre eminently unsatisfactory to those counties that are each, yearly petitioning for from ten to thirty miles.

Such is the demand over the United States for improved highways that politicians of all shades are making it a plea for popular favor, the platform of both parties being pledged to liberal appropriations for stone roads, notably in Massachusetts, where the sum is approaching the million dollar mark. The signs of the times indicate that road improvement in the next decade will spread with great rapidity. The problem of cheap transportation can never be solved until every farm and hamlet can move its products to the markets over finely macadamized roads.

PLANS FOR CHEAPENING CONSTRUCTION.

The National Good Roads Parliament recently in session at Atlanta discussed the advisability of using convict and tramp labor in the construction and maintenance of stone roads. The result was a resolution advising the different States to utilize their convicts in that direction. The problem of keeping them employed without bringing their products in competition with the productions of free labor might in this direction be satisfactorily solved. The cost to the counties using convict labor in road building is about twenty-four (24) per head, and many roads in the Southern States are being improved by this class of labor, and these sections are being enriched with macadamized highways that otherwise would not, in this generation, enjoy their benefits, which, with proper attention, will add much to the facility of travel and greatly to the wealth of the communities through which they pass.

SUGGESTIONS.

Although so much has been written about the proper plans and materials for the construction of stone roads, it is still necessary to emphasize certain points which, if neglected, tend to defeat the object we have in view, viz., a road that is firm, smooth and convenient for travel at all seasons of the year.

I have noticed, where the roads do the most raveling, the stones were of unequal size, many of them flat and long. When they are angular and cubical or about the same size in all directions they knit together by the traffic, but where long and flat, a wheel passing over them presses one end down and that tends to lift the other end up, thus destroying the integrity of the road-bed.

This has led me, in preparing general specifications for the use of all the counties, to insist on stone not larger than two inches, preferably one and one-half inches in diameter, and I believe, from observation, that all macadam road-beds would become more thoroughly united, more one homogeneous mass, if all the stones from top to bottom ranged from one, to one and a half inches in diameter. Uniformity in size seems almost impossible from the workings of the machine stone-crushers, therefore the size specified should be small, so that two and one-half, three or four-inch stone would be an impossibility. Great care should be taken that the long, flat and flakey stones should be again passed through the crusher.

MacAdam summed the whole question into one paragraph when he said, "That a stone which exceeds one inch in any of its dimensions is mischevious." His whole theory and practice was "that stones broken small and shaken and pressed together by the traffic, rapidly settled down face to face and angle with angle, and made a mass as close as a wall," and my observation is that the greater the departure from this, the poorer the bed. This point should be thoroughly emphasized with all our contractors, engineers, supervisors and freeholders, for on account of the great cost of crushing fine, the tendency is to allow large sizes to pass and become partners with the legitimate-sized stones, but they have always proved and will always be mischevious bed-fellows.

"Large metal, although ever so well binded and rolled, will, in a short time, present an uneven surface, not having the same capacity for forming into the concrete as the smaller metal."

And here is where, perhaps, the convict labor could be properly utilized in the hand-breaking of stone, as thus they would be more uniform in size and of a cubical form, the most desirable for road-building. Roads should also be thoroughly consolidated by rolling and wetting, so that the water will even press out before the roller, or the angles of the broken stone will be worn round by continual disturbance, and thus perfect compacting becomes impossible.

The improvement of our highways increases our comfort and stimulates every agricultural, manufacturing and commercial industry. There is, perhaps, no other State in the Union that will secure so many advantages from stone roads as New Jersey. The immense populations that are gathering within and just over the east and west sides of her borders, are rapidly overflowing into the surrounding country, and moving along the lines of least resistance or most pleasing surroundings. Rapid transit is carrying them each year to more and more distant points, and the parts of New Jersey that present the greatest attractions in the shape of good roads and well-shaded avenues, will catch the many that, from necessity, health and comfort continually seek suburban homes.

Although New Jersey is situated in the midst of the greatest population on the face of this continent, the prices of her farm lands have for twenty years been decreasing in value, because the product of the western farms from cheap lands and cheaper transportation are sold at our doors for less than we can raise them. Our farmers, driven from the growth of their old-time standard crops, wheat, rye, pork and cattle, have resorted to milk, fruits and vegetables. But the rapid development of the South is bringing to our home markets, in yearly increasing quantities, the perishable articles of whose sale we thought we had the monopoly, and so, before our productions grow to perfection, the great cities are flooded with southern fruits and vegetables; our farmers scarcely finding refuge in a new citadel before a ruthless invader storms and carries it.

Profit becoming less and less each year, farm values steadily decrease, and the only resort that seems to be left to the farmer is to make his broad acres so attractive, his city brethren will be induced, in their outlook for rural homes and villa sites, to purchase portions of his homestead.

The first temptation will be good roads. Paved highways are reaching out in all directions from our populous centers, and along

them the thrifty denizens of our many cities are moving in constantly increasing numbers, the older pikes showing in many places large settlements.

The electrical and steam roads are forming many new centers out from which radiate other populations, and thus the wastes are being rapidly settled. Those, therefore, who first improve their highways will receive the first reward in the increased price for which they can sell their acres, no longer profitable for agricultural purposes, but valuable for homes.

So, rapidly improve your highways with trees and macadam, and thus hasten the time when the whole State between the two great cities will become one vast hive of pleasure and industry; then Jersey farmers will no longer mourn for lost values, but bless the law that first came to their assistance and stimulated them to road improvement.

In my journeyings over the State I have noticed that stoning the main thoroughfares has stimulated the township authorities and private individuals to improve the side-roads leading thereto; they are eliminating the pools of water which, through neglect, formed in the center and through which for years they have traveled. Have graveled where material is handy, and stoned in many places where quarries are easily accessible, thus demonstrating that the State aid is not only the means of procuring many miles of hard and smooth highway, but has given them privileges which, once enjoyed, create a spirit of dissatisfaction with the old order of wading through mud and sand.

OYSTER-SHELLS, GRAVEL AND OTHER GOOD MATERIAL.

Although three petitions have been made to freeholders for this class of roads, and I have, through urgent requests, visited numerous gravel-pits and rotten rock-beds, only one application for approval has yet been made, and that for an oyster shell road in Salem county, two and one-half miles long. In some cases, when consulted, I have found the cost of gravel, on account of long transportation, to be more expensive than stone, and have, after careful calculations and comparisons, so persuaded the applicants that they have changed their petitions from gravel to stone.

Where gravel and other good material, aside from stone, is insisted on and the construction is very much cheaper, I would not withhold

my approval, but believe the best use for gravel is a slight dressing over the stone during the late spring, when drouth threatens the raveling of the surface.

There are many earnest advocates of gravel roads, but our experience and observation is, that they will not long sustain heavy traffic. The material of which the beds are composed is generally so irregular in stratification, varying so often in the same beds in its quality, sometimes clay predominating, in others layers of sand—then, perhaps, pockets of gravel-stones will be the rule. So when applied to the surface it soon shows unequal wearing qualities, the road becoming full of depressions, besides the constant tendency of the rains to wash out the clay and other binding material, leaving loose beds of sand and gravel.

ADDITIONAL LEGISLATION.

We would suggest that the Legislature amend the act approved March 16th, 1893, to enable township committees to encourage the use of broad tires on wheels by a rebatement of taxes.

To make the rebate of $1 for each wheel instead of fifty cents, and require the township committee, where stone roads are becoming common, to pass such an ordinance and extend such privileges for a term of three years, and at the end of that time to become compulsory with penalty and without reward for vehicles carrying fifteen hundred pounds and over.

The rebate plan would probably be more effective than penalty, and the loss from taxation would be more than made up by the lessened cost in repairs, the broad tires rolling and compacting in the place of the narrow ones disintegrating.

The workings of the State Road Act of March 22d, 1895, is so effective that perhaps it would not be good policy to change its provisions, although there is some friction. Its confiding the selection of the roads to be first improved to the freeholders, is a fruitful source of log-rolling between those representing different sections, and this sometimes prevents the most leading and useful road from receiving early benefit.

SUPERVISORS.

The selection of a supervisor by petitioners results in a great flood of petitions to the Commissioner, some roads having as many as five

candidates for the position, and many of their papers are signed by the same property-holders, thus virtually transferring the selection to the Commissioner, but limits the horizon of his choice.

GRADING.

In some counties the townships have mostly graded the road-beds at their own expense. In others the townships are not willing to incur this outlay, therefore the State aid covers a portion of that expenditure, so that in the distribution of the State funds some counties receive more per mile for grading than others. If any change in the law is made, it should be along the line of having the road-bed graded before the State aid applied. This would result in more miles of road, spreading the appropriation over a greater surface, more rapidly hasten the day when the highways would be macadamized, and thus minister to the desire many counties express to have their roads quickly improved.

STEEL WAGON-ROADS.

As all progress should be along the best lines, and as some of the best authorities predict, the coming highways will be of steel.

It would be well for New Jersey, as she is the pioneer in State aid road improvement, to take the lead in inaugurating a system of steel roads, and thus ascertain by actual experience whether it is the most efficient and economical highway.

The claims as presented are that the average cost of a macadam road-bed sixteen feet wide is about $7,000 per mile. The cost of a double-track steel railroad, sixteen feet wide, filled in between with broken stone, macadam size, is about $6,000 per mile.

The cost of a rural one-track road, $2,000 per mile. The rails to be made of steel the thickness of ordinary boiler-plate, and to be formed in the shape of a gutter, five inches wide, with a square perpendicular shoulder half an inch high, then an angle of one inch outward, slightly raised. This forms a conduit for the water and makes it easy for the wheels to enter or leave the track.

The advantages of steel rails are, first, longer wearing qualities than stone; second, one horse will draw on a steel track twenty times as much as on a dirt road, and five times as much as on macadam.

We would therefore recommend that legislation be enacted and appropriations be made by which the Commissioner should be empowered to authorize the construction of some experimental steel-track roads.

TAX ON BICYCLES.

There has been considerable agitation on the subject of taxing or licensing bicycles, the advocates of the scheme claiming that, as they demand unusual good roads, they should directly pay for their maintenance and repairs.

But the question arises, why should they be taxed and wagons and carriages go free? Bicycles are makers of good roads, draft and speed wagons and teams are in most cases very destructive to their integrity, so legislation on these lines should proceed with extreme caution.

In France a tax of nine francs, or $1.93, per wheel is imposed on bicycles and tricycles, which amounts to about $400,000. It is estimated that in this country about 400,000 persons ride a wheel. A tax of $2 a wheel would amount to $800,000 per year, a very snug sum, that would go a great way towards keeping the roads of the country in good repair. France also imposes an annual tax on all carriages. Those with two wheels, $9.65; with three wheels, $14.37; four wheels, $19.30, payable monthly in advance.

A tax of this kind in the United States would probably build, macadam and repair all the prominent highways.

HORSELESS CARRIAGES.

Four hundred thousand bicycles have been great factors in improving country roads, but horseless carriages promise to be equally potent or more powerful instruments in the same direction. Many varieties of these are being used with wonderful success on the superior highways of France, and much talent and capital in this country is entering into their construction.

Gas, gasoline, hot and compressed air, electricity and petroleum are each being used as motive power, but petroleum motors seem to be in the lead. The cost of running them is said to be one-half the cost of horses, less than one-half cent per mile.

On macadam roads their speed is about fifteen miles per hour, and their use will, especially with pneumatic tires, present so small an

amount of friction that repairs of the road-bed will be reduced to a very small fraction. Thus provision for good roads can scarcely keep pace with the invention of appliances to economically use them.

TOLL ROADS.

Complaints are being made by farmers and others that they are required to pay from fifty to one hundred and fifty dollars per year for carrying their products to market over roads that are not better than those which their not far distant neighbors are traveling over free. This complaint is rapidly developing a sentiment against all forms of toll roads and is crystalizing into efforts to so shape legislation that all corporate turnpikes will gradually be brought under the operations of the State Aid law. For the macadamizing of these roads, bonds have been issued, but free stone roads are drawing away so much of their former patronage that many are failing to earn sufficient interest for these bonds, thus working a double injustice. Thus those who are forced to use the toll roads not only pay the tax of the toll, but their share of the county tax required to build and repair the free roads.

In the neighborhood of Camden there are about forty miles of these roads leading to Camden. To place them under the operations of the State Aid law would require about two thousand dollars per mile, or eighty thousand dollars.

A law similar to the one that last year passed only the Senate would seem to be the equitable way of settling this vexed question.

The following letter from a prominent citizen of Burlington county expresses the condition that exists in the vicinity of Camden so well that we print it in full :

MARLTON, N. J., Dec. 5th, 1895.

Henry I. Budd :

ESTEEMED FRIEND—In making up thy annual report as State Road Commissioner, it seems to me, and to many others similarly situated, that it would be just and proper for thee, as a servant of the community, to represent or allude to the injustice a part of the citizens of this and Camden county, and perhaps some other localities, of being compelled in carrying on our farm and trucking to be subjected to double taxation in paying our tolls over the turnpike roads and bearing our share of the taxes for the building and maintenance of the many free stone-roads now throughout the community.

To some of our large farmers this toll amounts to as much as from one hundred to one hundred and fifty dollars each year, and it seems unfair to burden one portion of the citizens while others can have equal advantages free.

Another feature of the case, and one of importance, is this: Just previous to the passage of the bill for the improvement of our public roads most of the gravel turnpikes felt compelled to more permanently improve their roads by issuing bonds and building permanent stone roads, and many invested in these bonds believing it to be a duty to assist in this improvement; but the building of so many free roads has in most cases so diverted the travel and crippled the finances of these companies, that it seems a question how long they will be able to meet their bonded interest and maintain their roads, and these, being the leading roads to market, would (had such legislation been anticipated) have been the first to have been surrendered to the county, and been improved under the present law; and now why cannot an act be passed for the taking up of these turnpike roads, and those who have taken bonds be relieved by the State and county, taking and paying for them in a similar manner to the present existing law?

I understand thee has prepared thy report, but it has not yet been printed, and if some encouragement similar to the report of our late valued friend Edward Burrough be suggested by thee it would bring the subject before the public and have an influence for good and justice, and I hope thee will so decide and act accordingly. The bill that was before the Legislature last winter bearing on this matter, and which passed the Senate unanimously, but was lost in the House by a small majority, will, I expect, be revived, and any influence thee may have favorable to its passage would be appreciated by some of us sufferers.

Trusting thee will consider this subject carefully, and if at all possible, to take some action thereon, I remain,

Sincerely thy friend,

WM. J. EVANS.

SALARY.

In the few months of our service we have learned that the proper performance of our duties requires the most of our time. The different roads under construction have been and should be frequently inspected. A thorough knowledge of all materials used and contemplated should be obtained. The best and cheapest methods and the needs of communities applying for State aid should be carefully studied. Therefore we believe it would be better policy for the State that the office of Commissioner should be salaried instead of a per diem allowance, with a fixed appropriation for salary and expenses covering the necessary clerical help and traveling expenses and occasional outlay for legal and engineering advice.

HENRY I. BUDD,

State Commissioner of Public Roads.

Arguments in Favor of Stone Roads.

ARE STONE ROADS ECONOMICAL?

Mr. Clayton Conrow, of Burlington county, says:

Good roads are the foundation of successful farming; they must be built by one of four authorities—township, county, State, or by companies. The system of construction by township was inherited from our English ancestors, and we have discovered it to be an error. Roads are not confined to townships or counties, but extend over the entire State, therefore, State authorities should control them. Bad roads may turn a successful farmer to a business loss. Before the construction of stone roads in Burlington county, it cost fifteen cents per basket to market truck; now it costs three cents.

WILL FARM PROPERTY BEAR THE TAX NECESSARY TO BUILD TELFORD OR MACADAM ROADS?

John G. Whitall, of Woodbury, N. J., writes:

The importance of the common roads is perhaps realized by but few of us, and yet it is safe to say that of all the systems of inter-communication in our country of land or of water, there is none more important, none more wastefully expensive, and none more susceptible of improvement than the common roads. That none are more important will readily be seen, when we consider that almost all the subsistence of the people of our country, nearly all the exports of the country, the greater part of all the business of the railway and canals of the country, must first be moved over the country roads. Such being the importance of these roads, why is it they are not put in, and maintained in, better condition? It can only be because the public generally do not fully realize the difference in the cost of moving a load over a common dirt-road and over some of the improved roads "There is no tax so great as the tax of bad roads," and of all persons who have to pay such tax, none have to pay it to so great an extent as does the farmer, for he has to haul all of his produce to market over these roads, and also nearly all of his supplies for his home over the same.

A road may be described as a line of communication, and the ideal road is a line of the least resistance, level, straight and with a hard, smooth surface. The importance of this last will perhaps be more fully understood when we remember that the amount of power required to pull a load of one ton over

different level surfaces requires greatly different powers, as the following table will show, together with the cost of moving the same :

To pull one ton on sand requires 400 lbs., costing 40 cents ; to pull one ton on hard earth requires 200 lbs., costing 20 cents ; to pull one ton on macadamized road requires 100 lbs., costing 10 cents ; to pull one ton on best macadamized road requires 50 lbs., costing 5 cents ; to pull one ton on sheet asphalt requires 15 lbs., costing ½ cent ; to pull one ton on iron tram-rails (street railway) requires 10 lbs., costing 1 cent ; to pull one ton on steel rails (railway) requires 9 lbs., costing $\frac{9}{10}$ cents ; to pull one ton on water (canal) requires 2 lbs., costing $\frac{2}{10}$ cents.

If we examine this table, the great difference in the amount of power required to pull a load over even the macadamized or stone road and over the iron tram or street railway will at once attract our attention, and would seem to point to the latter as the ideal road, and the cost of operating electric railways is so small that the time is probably not far distant when they will ask the privilege of occupying some of our principal thoroughfares, while the ease with which loads can be moved over them would seem to make them desirable, but for the most part any improvement to our roads must be by macadamizing. By our table we find that it requires but one-half (or even less) the power to move a load over a stone road than over a hard earth road, but as most of our roads are not hard earth roads, the difference in the amount of power required is even much greater than that, and as the greater part of our hauling to market has to be done in the hot months, it would be a great relief to our teams in that hurried season to have the improved roads, and also a great saving to the farmer, as the cost of keeping a horse, including first cost, is easily $125 per year If by improving our roads we could dispense with one horse, we save that amount, and there are, we believe, many farmers in our county who could dispense with one horse if our principal roads were macadamized.

Since roads are *public* highways, they, or at least the principal or leading ones, should be maintained by the *public ;* that is the main or principal lines of roads should be maintained by the county or State, the efforts of the local or township authorities being directed to the local roads. Under our State laws at present, upon application of two-thirds of the property owners abutting upon a certain road, offering to pay ten per cent of the cost of a stone road over such highway, it becomes the duty of the Board of Freeholders of the county to have such road built, the cost, after deducting the ten per cent which must be paid by the property owners abutting upon the road, to be paid one-third by the State and the remaining two-thirds by the county.

Suppose, under this law, the county should, within the next twelve years, be called upon to build fifty miles of such road. We are assured that good macadamized roads, nine feet in width, have been built in adjoining counties at a cost of $4,000 per mile ; but put the cost at $6,000 per mile, the cost of building the fifty miles of road would be $300,000 ; ten per cent. of this sum—$30,000—to be paid by the property holders abutting upon the road, leaving $270,000 to be paid by the county and State, of which the county would have to pay $180,000, which, distributed over the twelve years, would require $15,000 to be raised each year by taxation. The assessed value of the property in the county exceeds $14,800,000, so that, allowing for but a very slight increase in the taxables of the county, a tax of one dollar upon each $1,000 of the taxable prop-

erty of the county for twelve years would be all the tax required to build us fifty miles of macadamized roads. This fifty miles of road would extend from Paulsboro to Bridgeport, seven miles; Westville to Glassboro, by way of Hurffville, ten miles; Glassboro to Franklinville, six miles; Barnsboro to Hardingville, seven miles; Mullica Hill to Salem county line, four miles; Fairview to Williamstown, nine miles; making fifty miles of road, and would include about all of the principal roads of the county outside of the turnpikes. This list is given merely for comparison, and could be changed or added to as the persons abutting upon the roads asked for the building of the same.

And would it not pay? Let each of us take the assessed value of our estates, and reflect if such a system of roads would not pay us more than the one dollar per year for each thousand dollars for twelve years, required to build them If it will not pay, how is it that England, France, Germany, Switzerland, and, in fact, all civilized countries, are building the best roads that can be made, and some of them in the face of difficulties which to us would ppalling. The Swiss, although far from being a wealthy people, have built roads through gorges and around precipices which would seem impossible, and which, it is stated, must have cost over $1,000,000 per mile. In England, where all the principal roads are improved, it is estimated that the saving effected by such improvement, so that three horses can do the work of four, amounts to $100,000,000 annually. In the State of Illinois it is stated that the cost of hauling the farm products of the State to market is at least $15,000,000 annually more than it would be if the roads were improved, and that such improvement would add $100,000,000 to the value of the farms. In one county in Northern Indiana, where the principal roads were macadamized by the county, the increased value of the farms, as valued by the farmers themselves, was nine dollars per acre, not for those farms upon the line of the improved road only, but the average increased value of the farms of the whole county In our own State, wherever the improved roads have been built under this law the price of farm lands has materially increased, and the public are, it is stated, entirely satisfied with the expenditure, and continue increasing the number of miles built, considering it a good investment.

Yet many farmers, when asked to favor a project for the improvement of roads, put it off, as they would a luxury, "until better times." While they acknowledge that better roads would be a good thing to have, it never seems to occur to them that to improve the roads would be a good investment, just like raising higher grade stock, or using improved and labor-saving machinery. There are, we believe, very few farmers who, if they could, by procuring some labor-saving implements, effect near such a saving as would be made by improved roads, but who would procure such implement at even a much greater cost than would be the cost to them of macadamizing the roads.

There is still another aspect to the matter, the social one; improved roads would tend to destroy the isolation that is an objection to farm life, and promote sociability and intercourse among farmers and others; "as iron sharpeneth iron, so the countenance of men sharpeneth that of his fellow-men," the farmers would acquire new ideas, they would become more genial, and their laborious life become more pleasant. Man is a social animal, and as we mend our ways and give our city cousins the opportunity to come among us, and see more of us, as they pass along on our improved road they would rejoice at these

evidences of our enterprise and perhaps conclude to cast their lot with us, and become one of us, and so build up our country and place it in the position its geographical position entitles it to. For these and for other reasons which might be adduced, we believe we can answer the question in the affirmative, we believe that "Farm property can bear the tax necessary to build stone roads."

Silas Betts, of Camden county, says:

Not for twenty years has any law been passed by the New Jersey Legislature that has reflected so much credit on the State as the Road law.

E. C. Harrison, a prominent promoter and builder of stone roads, says:

The cost differs greatly according to the foundation of the road. In the northern part of the State, some years ago, a stone road would cost from $10,000 to $15,000 a mile, which, however, was an exhorbitant sum, as a good road can be constructed for from $3,000 to $7,000 per mile. To keep a good stone-road in repair will cost about $50 a mile each year, while two miles of gravel turnpike I have known to cost $1,500 per annum for repairs. On a dry, sandy bottom the macadamized road is the cheapest and best, while on a wet, springy bottom the Telford road is the best. We want a sentiment stirred up among the people to get the State to appropriate $300,000 next year for stone roads.

MASSACHUSETTS HIGHWAYS.

The Commissioners now have before them 220 petitions, coming from towns all over the State, asking that work be done on the roads within their borders, and the Commission is now building roads in forty different places, and there will be completed by the end of the year from sixty to seventy pieces of road of various lengths. When all the work asked for in these petitions has been done, it will mean the construction of between 700 and 800 miles of first-class road.

COST OF HAULAGE ON DIRT ROADS.

What portion of the total cost of haulage is chargeable to bad roads can be better ascertained when the report from our consuls abroad regarding the cost of haulage on good roads is received. This information has been asked for from the State Department by the Secretary of Agriculture in a recent communication.

The increase in cost of haulage actually done is by no means the only loss by bad roads. The loss of perishable products for want of access to market, the failure to reach market when prices are good, and the failure to cultivate products which would be marketable if markets were always accessible, add many millions to the actual tax of bad roads. Moreover, the enforced idleness of millions of men and draught animals during large portions of the year is a loss not always taken into account in estimating the cost of work actually done.

Information already in possession of the Office of Road Inquiry indicates that, all things being considered, nearly if not quite two-thirds of this vast expense may be saved by road improvement, and this at a total cost not exceeding the losses of three or at the most, four years by bad roads.

There is at least enough in these facts to justify the assertion of the National League for Good Roads, endorsed by the Chamber of Commerce of the State of New York, that "the movement for good roads deeply concerns every commercial and financial interest in the land. We are handicapped in all the markets of the world by an enormous waste of labor in the primary transportation of our products and manufactures, while our home markets are restricted by difficulties to rural distribution which not infrequently clog all the channels of transportation, trade and finance."

The Division of Road Inquiry of the Department of Agriculture has completed an interesting investigation relating to the traffic of the country roads in the United States, the results of which will be published in due time as Circular No. 19.

With the aid of the Division of Statistics reports have been gathered from about 1,200 counties, giving the average length of haul in miles from farms to market or shipping points, the average weight of load hauled, and the average cost per ton per mile, and from this is deduced the average cost per ton for the whole length of haul.

These returns show the average length of haul in the Eastern States to be 5.9 miles; in the Northern States, 6 9 miles; in the Middle States, 8.8 miles; in the Cotton States, 12.6 miles; in the Prairie States, 8.18 miles; in the Pacific Coast and Mountain States, 23.3 miles, and in the United States, 12.1 miles.

The average weight of load for two horses in the Eastern States is 2,216 pounds; Northern States, 2,136 pounds; Middle Southern States, 1,869 pounds; Cotton States, 1,397 pounds; Prairie States, 2,400 pounds; Pacific Coast and Mountain States, 2,197 pounds, and the United States, 2,002 pounds.

The average cost per ton of 2,000 pounds per mile in the Eastern States is 32 cents; Northern States, 27 cents; Middle Southern States, 31 cents; Cotton States, 25 cents; Prairie States, 22 cents; Pacific Coast and Mountain States, 22 cents, and the United States, 25 cents.

The average total cost per ton for the whole length of haul: Eastern States, $1.89; Northern States, $1.86; Middle Southern States, $2.72; Cotton States, $3.05; Prairie States, $1.94; Pacific Coast and Mountain States, $5.12, and the United States, $3.02.

With these data it becomes possible to obtain approximately the total cost of the entire movement of farm products and other classes of materials over country roads.

Taking the census returns of the farm products of the United States for 1890, adding eight per cent. for the increase in five years corresponding to the increase in the previous ten years, finding the weights of the various articles, and reducing the total to tons of 2,000 pounds, we have a total weight of farm products for the year 1895 of 219,824,227 tons.

Comparing the amounts by States, Iowa leads, with 24,287,000 tons; Illinois comes next with 21,000,000 tons; Kansas, with 17,000,000; Missouri, New

York, Ohio and Nebraska, with 12,000,000 to 13,000,000 tons; Indiana and Pennsylvania about 10,000,000; Michigan, Minnesota and Wisconsin, 7,000,000 to 8,000,000 tons, and Texas, Colorado, Kentucky and Tennessee, 4,000,000 to 5,000,000 tons.

No information is available as to the amount of hay and grain consumed upon the farms where they are raised, nor is there any return of large classes of materials moved over the country roads, among which are building materials, including stone, lumber, brick, lime and sand; fencing materials; road materials, gravel, stone, etc.; fertilizers, commercial and domestic, lime and plaster; coal, ore and metals; straw and fodder; home-killed meats, and animals driven to market; garden products and grass seeds; poultry and eggs; merchandise and farm machinery.

It is deemed safe, however, to offset these various items against home-consumed hay and grain, and so count the equivalent of the total farm product as being hauled on the public roads.

MONEY WASTED ON HIGHWAYS—MOST OF IT GOES FOR REPAIRING OUR POOR ROADS.

The total length of the common roads in this country—good, bad and indifferent—is estimated by General Stone, of the Road Bureau of the Department of Agriculture, at something over 1,300,000 miles. The majority of these roads have been opened by common laborers hired by county supervisors, and no engineering principles have been observed in their construction. As a result it costs more to keep them in repair than if they were so many finely macadamized roads. Keeping these poor roads in repair and opening up new thoroughfares cost Massachusetts, in 1893, outside of cities, $1,136,944, or $66.30 per mile; New York, $2,500,000, or $30 per mile, and New Jersey, $778,470.82, or $43.25 per mile. The total expenditure for roads in that year amounted to about $20,000,000. As a greater part of this enormous sum was spent to repair poorly constructed roads that would need exactly the same improvements again the next year, it is not an exaggeration to say that most of the money was wasted.

Fine roads can be constructed all the way from $400 to $7,000 per mile, according to the nature of the country through which they pass, the cost of crushed stones and other engineering problems. The cost of keeping these roads in repair is infinitely smaller than that required to repair the ordinary dirt roads each winter and spring, when great gullies and ruts are washed into them by the rains and floods. The secret of the success of the fine roads in France is attributed to the prompt and systematic repairs made at all seasons of the year. This principle is observed upon our best railroads, and the great trunk lines that reduce the wear and tear to the smallest minimum by promptly repairing any defect or injury make the most money. This rule is just as true with macadamized roads. It is economy both for the roads and the vehicles to repair the slightest defect as soon as discovered and before it has had time to spread.

Statements by Engineers and Supervisors.

Following is the Engineers' and Supervisors' more detailed statements of the cost of the different roads:

MEDFORD, N. J., July 2d, 1895.

To the Board of Chosen Freeholders of Burlington County:

I hereby certify that the following is a true estimate of the cost of stone road construction on the road leading from Evesboro to Cross Roads, in the County of Burlington, a distance of five and one-fifth miles nearly, viz.:
Length of road, less 23 ft.; for bridge, 27,414 ft., or 30,460

sq. yds, at $1.10 per sq. yd.		$33,506 00
513 cubic yds. shouldering and fills, at 80c. per cubic yd.	$410 40	
55⅝ cubic yds. excavation, at 25c. per cubic yd.	13 89	
58⅓ cubic yds excavation for drains, at 25c. per cubic yd.	14 78	
100 sq. yds stone drains, at 72c. per sq. yd.	72 00	
Stone for washouts on fills	10 00	
		521 07
		$34,027 07
Engineer's Commission, at 2 per cent		680 54
Supervisor's salary		561 00
Total cost of road		$35,268 61

CHAS. T. HARRISON,
Engineer.
WILLIAM JONES,
Supervisor.

To the Honorable Henry I. Budd, State Commissioner of Public Roads:

I herewith present an estimated statement of the cost of construction of the County road leading from Vincentown to the Cross Roads, in the County of Burlington, State of New Jersey, improved under the provisions of the State Aid law, and completed during the year A. D. 1895, as follows, to wit.:

25,893$\frac{1}{2}\frac{9}{7}$ sq. yds Telford, at 86c.	$22,268 58
Five ft. additional width at Kirby Mills, 201 ft. long, 111$\frac{2}{3}$ yds., at 86c.	96 03
Five ft. additional width at Vincentown, 738½ ft., 410$\frac{5}{18}$ yds., at 86c.	352 84
Wings to bridges and approaches to roads, 790 yds., at 86c.	679 40

Grading, excavating, shouldering, hauling and placing	$850 30
Filling 200 cubic yds., at 23c	46 00
Commission of engineer, at 2 per cent	485 86
	$24,779 01

CHAS. T. HARRISON,
Engineer.
JOHN P. LIPPINCOTT,
Supervisor.

MAGNOLIA, N. J., October 25th, 1895.

Statement as to cost of Collings road, in Haddon Township, Camden County, New Jersey:

Preparation of the road-bed	$365 52
Telford center, 8 ft. wide, 10 in. deep, 7,495.68 sq. yds., at 78c.	5,846 63
Macadam wings, 2 ft. wide, 6 in. deep, 3,747.84 sq. yds., at 42c	1,574 09
Telford centers at intersections of cross streets, 148 sq. yds., at 78c.,	115 44
Macadam wings at intersection of cross streets, 157,440 sq. yds., at 42c.	66 12
Extra depth of foundation, 2 in., at 4c. per sq. yd., per in. deep, 1,197⅓ sq. yds., at 8c	95 79
Engineering expenses	230 94
Supervisor's salary	613 50
Total cost of improvement	$8,908 03

J. J. ALBERTSON,
County Engineer.
RICHARD T. COLLINGS,
Supervisor.

MAGNOLIA, N. J., Oct. 25th, 1895.

Statement as to the cost of Browning's Lane, in Centre Township, Camden County, New Jersey:

Preparation of road-bed	$441 33
Telford center, 12 in. deep, 8 ft. wide, 11,423.95 sq. yds., at 79c	9,024 92
Macadam wings, 6 in. deep, 2 ft. wide, 5,749.87 sq. yds., at 42c	2,414 94
Extra depth on wings of 1 inch, 5,749.87 sq. yds., at 4c	229 99
Engineering expenses	355 50
Supervisor's salary	690 00
Total cost of improvement	$13,156 68

J. J. ALBERTSON,
County Engineer.
JAMES BELL,
Supervisor.

MAGNOLIA, N. J., Oct. 25th, 1895.

Statement as to cost of improving Berlin road in Gloucester and Waterford Townships, Camden County:

Preparation of road-bed	$744 26
Telford 10 in. deep, 10 ft. wide, 24,595 sq. yds., at 73c	17,954 35
Telford 10 in. deep, 14 ft. wide, through the village of Berlin, 5,412.4 sq. yds. at 73c	3,951 05
Macadam 10 in. deep, 10 ft. wide, 2,777$\frac{7}{9}$ at 74c	2,055 56
Extra depth of foundation of 2 inches, 888$\frac{8}{9}$ sq. yds (at 8c. per inch per sq. yd.) at 16c	142 22
Engineering expenses	727 15
Supervisor's salary	616 50
Total cost of improvement	$26,191 09

J. J. ALBERTSON,
County Engineer.
G. H. HIGGINS,
Supervisor.

To the State Highway Commissioner of New Jersey:

DEAR SIR—The following is the cost of grading and paving with Telford paving Mount Pleasant avenue, in the Township of Livingston, Essex County, New Jersey:

Total cubic yds. of excavation 25,214, at 30c	$7,564 20
Total length of pavement, 13,210 feet, at $1.49	19,682 90
Advertising	30 10
Surveying	891 00
Supervisor	510 00
	$28,678 20

JAS. OWEN,
County Engineer.
T. M. HOFFMAN,
Supervisor.

NEWARK, N. J., Oct. 28th, 1895.

To the State Highway Commissioner of New Jersey:

DEAR SIR—The following is the cost of grading and paving with Telford pavement the Pompton Turnpike, in the Township of Vernona, Essex County, New Jersey:

Original grading contract.

28,180.6 cubic yds. earth, at 31c	$8,736 00
1,788 cubic yds. earth, at 30c	536 40
1,335 cubic yds. rock, at $1.35	1,802 25

Paving contract.

19,707 cubic yds. earth, at 27c	$5,320 89
21,043 lineal feet of pavement, at $1.03	21,674 29
Surveying	1,580 00
Advertising	63 34
Supervisor	517 00
	$40,230 17

JAS. OWEN,
Engineer.
J. J. THATCHER,
Supervisor.

Statement as to cost of Swedesboro road, Gloucester County, New Jersey, October 8th, 1895 :

Preparing road-bed	$260 58
6,537.5 sq. yds. of 12 in. deep Telford, at 86c	5,622 50
4,076.39 sq. yds., 6 in. deep Macadam, at 59c	2,405 07
1 sq. yd., 12 in. deep, extra width, at 86c	86 00
3.45 sq. yds., 4 in. deep, extra center, at 8c. per in	110 40
3.68⅓ sq. yds., 1½ in deep, extra wings, at 8c	44 20
2,098 ft. stone drain, at 18c	377 64
Supervisor's salary	243 00
Engineer's expenses	179 36
Legal expenses	26 00
Total cost of improvement	$9,354 75

J. J. ALBERTSON,
Engineer.
JAMES J. DAVIDSON,
Supervisor.

Statement as to the cost of Crown Point road, Gloucester County, New Jersey, October 8th, 1895 :

Preparing road-bed	$1,721 90
38,256⅞ sq. yds. 10-in. Telford, at 74c	28,310 03
5,161⅔ sq. yds. 1 in. extra deep, at 8c	412 89
119.1 sq. yds. extra wide, at 74c	88 13
6,381 ft. tile drain at 5c	319 05
Engineering expenses	627 17
Supervisor's salary	535 50
Legal expenses	32 10
Total cost of improvement	$32,046 77

J. J ALBERTSON,
Engineer.
THOS. W. WYNE,
Supervisor.

WOODBRIDGE, N. J., October 8th, 1895.

To Henry I. Budd, State Commissioner of Public Roads:

As required by law, I herewith submit a detailed and itemized statement of the cost of the road in Middlesex County, extending from a corner near Lehigh Valley Railroad station, Perth Amboy, through Woodbridge to Union County line, near Six Roads, said road having been fully completed, to wit:

15,734 ft. macadam, at 89c	$14,003 26
15,348 ft Telford, at $1.04	15,961 92
County Engineer	599 30
Supervisor	624 00
	$31,188 48

ASHER ATKINSON,
Engineer.
JOHN M. SUTTON,
Supervisor.

METUCHEN, N. J., October 15th, 1895.

To Henry I. Budd, State Commissioner of Public Roads:

As required by law, I herewith submit a detailed and itemized statement of the cost of the road in Middlesex County, extending from "Pumptown Corner" to Holly's Corner, said road having been fully completed, to wit:

9,791 ft., at 96c	$9,399 36
County Engineer	188 00
Supervisor	333 00
	$9,920 36

ASHER ATKINSON,
Engineer.
NATHAN ROBINS,
Supervisor.

To the Hon. Henry I. Budd, State Commissioner of Public Roads:

I herewith present a statement of the cost of the Ewingville road:

27,178.44 sq. yds. macadam at 94c	$25,547 73
62.66 sq. yds. macadam at Walsh's, at 94c	58 90
Extra grading work on account of widening road at Judge Reed's	52 50
Grading road, excavating, shouldering, hauling, &c	469 50
Surveying and engineering expenses	1,043 80
	$27,172 43

JOHN ROCHE,
Supervisor.

Hon. H. I. Budd, State Commissioner of Public Roads:

In accordance with the law I hereby submit a statement of the cost of building the Telford road in the County of Mercer, and known as the Etra road, extending from Hightstown to Bodine's Corner, near the village of Etra, as follows, to wit:

13,331.89 sq. yds., 12 in. Telford, at 91c.	$12,132 01
774 cubic yds. clay binder, at 90c.	706 60
3,414 ft. tile drain, at 18c.	614 53
3–20-in. iron pipe and freight.	75 00
6–10-in. iron pipe and freight.	65 00
Hauling, placing, &c., iron pipe	105 70
Extra excavating, fills, shouldering and binding	984 05
150 ft. terra cotta pipe, draining roadsides, including freight	37 00
Supervisor's services.	345 00
Engineering expenses.	367 99
Total	$15,432 87

JOSEPH L. WATSON,
Engineer.
H. R. APPLEGATE,
Supervisor.

To Hon. Henry I. Budd, State Commissioner of Public Roads:

Below please find a statement of the cost of macadamizing Greenwood avenue, one of the public roads of the County of Mercer, as follows:

14,403 sq. yds. 12 in. Telford road, at 87c.	$12,534 96
350 sq. yds. 10 in. macadam road, at 63c	220 50
556.45 sq. yds. 6 in. macadam, at 50c.	278 22
553 33 sq. yds. extra 3 in. stone, at 36c.	191 99
Extra hauling, shouldering, excavations, binder, including filling on account of raising bridge, moving car-tracks, &c.	4,597 95
Iron drain-pipes.	189 00
Supervisor.	300 00
Engineering expenses	450 31
	$18,762 93

Respectfully submitted,
JOSEPH L. WATSON,
Engineer.
CHARLES C. ANDERSON,
Supervisor.

OFFICE OF J. J. ALBERTSON, COUNTY ENGINEER,
MAGNOLIA, N. J., November 12th, 1895

Hon. H. I. Budd, Commissioner of Public Roads, Mount Holly, N. J.:

MY DEAR SIR—It is with pleasure that we announce that Camden County has added three more free stone roads to its list.

The Collings road, extending from Collingswood, on the Haddonfield turnpike (a rubble road), westward, crossing the White Horse Telford road, ends in the Blackwoodtown turnpike, a total length of one and one-half miles. This is not one of the leading roads, but I feel safe in saying it was one of the *worst* at certain seasons of the year. Mr. Richard Collings, the supervisor of its construction, was one of the first in our county to petition for State aid, with the view to permanently improve this road. It passes over a clay soil that is noted for its springy bottom. Upon this we built a ten-inch deep Telford centre with macadam wings on either side six inches deep, adjacent to which we built an earth shoulder seven feet wide, nicely graded to conform to the curvature of the surface of the finished stone centre. In the particularly springy portions we increased the depth of the foundation-course two extra inches, at a cost of four cents per square yard for each extra inch in depth. In this immediate neighborhood we have more stone roads than any other portions of our country. Most of them have been built at the entire expense of an enterprising, but private, land improvement company.

The Browning's Lane road extends from Heading, on the Blackwood turnpike, to the Westville and Gloucester (Telford) turnpike. All the farmers east of Heading can save an hour on each trip by using this short cut to the Philadelphia ferry. What was once a private lane (as its name indicates) is now one of our great thoroughfares. This road was built under the supervision of James Bell. It is two and one-half miles long and twelve inches deep in center, for which 79 cents per square yard was paid Six-inch macadam wings on either side cost 42 cents per square yard. This road is just completed, and we hope our Board of Freeholders will accept it from the contractor to-morrow. We made provision in all our specifications, which were prepared before our present Road Law went into force, to retain five per cent. of total cost to make necessary repairs should the contractor neglect or refuse to attend to same promptly.

The Berlin road is an extension of the White Horse Telford road eastward, and is another link to the chain which will soon extend across our proud little State from the Delaware to the foremost of all the summer resorts.

At this time there is a petition being circulated to continue this great artery of travel to Atlantic county line, at which place we have every assurance from the officials that it will soon be finished to Atlantic City, thereby completing what will be the most popular bicycle course in America. The portion from White Horse to Berlin is built on the bed of the abandoned turnpike road, which we consider an excellent foundation, and therefore recommend a saving of two inches in depth of foundation. This link is only ten inches deep There is a stone center ten feet wide and earth shoulders seven feet wide on either side. Through the village of Berlin we built the stone bed fourteen feet wide. Hon. George Higgins is supervisor of construction. All three of our supervisors were appointed by our mutual friend, the late Hon. Edward Burrough

Two of our three roads that were accepted in 1894 have passed through very trying ordeals. At one time during our unprecedented drought they disintegrated badly, worse by far than we ever expected. We were not in a position to take care of them. Our freeholders realize that the free stone roads are as important and as valuable a part of the county property as its bridges. They have appointed an efficient Supervisor of completed stone roads, who is busy

attending to repairs and getting the material for the same, which he now has placed in convenient piles by the roadside, as is customary in England, where stone roads are centuries old and as smooth as a floor. This material he intends to apply in the depressions as they appear during the wet weather. It is useless to attempt any patching while the weather is dry. We used some clay to prevent raveling during the dry weather; it was effectual, but became annoying when it began to rain. Our Supervisor is now using a slight coat of gravel with much better results. We are proud to say that our Stone Road Committee is non-partisan and is composed of some of the best business men on our Board of Freeholders. They were very cautious as to recommending unnecessary expenditures, but when they became convinced as to what was for the best interest of the county they acted promptly. They have decided to water one of our completed roads during our next excessively dry period. We have three pumping stations nearly completed. Our committee have purchased three new iron rollers, which our Supervisor has been using to splendid advantage since our welcome rains began. Our roads again offer an inviting surface to the traveling public.

We have removed every wooden bridge except one on the roads we have improved this year, and replaced them with permanent stone arches or defective drain pipe, of which we can get any size up to six feet in diameter.

Yours very truly,

J. J. ALBERTSON,
County Engineer.

OFFICE OF JAMES OWEN,
NEWARK, N. J.

H. I. Budd, Commissioner of Public Roads:

Following is a list of townships in Essex County who have this year built stone roads:

Bellville township	5 miles.
East Orange	1 mile.
Orange City	1 mile.
Montclair township	½ mile.
Essex county (not State Aid)	1,500 feet.
Essex county (State Aid)	7 miles.

Yours respectfully,

JAMES OWENS,
County Engineer.

MAGNOLIA, N. J., November 12th, 1895.

Hon. H. I. Budd, Commissioner of Public Roads, Trenton, N. J.:

DEAR SIR—Gloucester county has completed, during the present season, its first stone roads, the contracts for which were made during the autumn of 1894, and mentioned in detail in my report to our dear friend, the late Hon. Edward Burrough, who labored so hard to educate the public in this county as they have been so long in Europe, with regard to permanently improved roads.

All great reforms meet with opposition; he found it difficult to get some people out of the conventional "rut." Strange to say, on this occasion it was not the illiterate countryman; he knew too well the meaning of the expression "in the old ruts." The farmer realized what a blessing it would be to have no ruts, then he could not get into them.

Some city people considered it unjust to be compelled to pave their own streets and then help to pay for improved country roads. The benefit comes to the citizen, indirectly. The past season has witnessed unprecedentedly low prices for vegetables; this is largely due to an over-stocked market, made possible only by increased facilities for transportation, thereby largely increasing the area for producing perishable crops. By this means the necessaries of life are delivered to the city people at greatly reduced cost.

It is an admitted fact that permanently good roads improve a community in every way aside from the pecuniary standpoint. The inhabitants of Swedesboro are delighted with their new road, and it seems to put new life into their old horses when they come into town from the surrounding sandy districts. Each one goes dashing along the smooth, hard surface regardless of his accumulated years or stiffened joints.

The inhabitants took up a private contribution and kept the surface sprinkled during our late dry season. The beautiful dense shade trees on either side of the street were a great help to prevent raveling. I would recommend the planting of some kind of hardy fruit trees by the sides of all stone roads This is customary in France. They would serve many purposes. They would beautify the landscape in spring with their blossoms, shade the road from the scorching sun in summer, and refresh the traveler with their gol len fruit in autumn.

The township in which Swedesboro is located was the first to act on our suggestions in last report as to the importance of wide-tread wheels. It paid $10 to each owner who would have his wagon's tread increased to four inches. Fifty of its enterprising citizens availed themselves of this liberal offer promptly, thereby exhausting the appropriation of $500 for the purpose. These fifty rollers, as they might be termed, have had a marked effect for good upon the dirt as well as the stone roads.

We have thoroughly underdrained both new stone roads in Gloucester county. The Crown Point road is now completed and is diverting much of the travel from the Woodbury turnpike, a toll road.

I do most earnestly recommend, as I did in my last report, that you use your valuable influence toward relieving the turnpike companies from this unjust competition. I would also urge my theory in reference to wide tires.

Very truly yours,

J. J. ALBERTSON,

Engineer of Construction.

MIDDLESEX COUNTY.

REPORT ON ROAD WORK FOR 1895. ASHER ATKINSON, ENGINEER.

During the past year this county has completed the roads from Perth Amboy through Woodbridge to the Union county line near Rahway, a distance of 5.85 miles, and the road from Pumptown Corner to Holley's Corner, a distance of 1.83 miles.

The road from Perth Amboy to Woodbridge is of Telford macadam, twelve feet wide and ten inches thick, costing 80 cents per square yard, and the road from Woodbridge to the Union county line is of macadam, ten feet wide and eight inches thick, costing 80 cents per square yard. The city of Rahway is extending their macadam to meet the work of this county, making a continuous line of good road connecting the Union county system with Woodbridge and Perth Amboy.

John F. Shanley was the contractor and John M. Sutton, of Woodbridge, the supervisor of this work.

The road from Woodbridge to Perth Amboy is subjected to the heaviest kind of traffic, owing to the continuous carting of loads of clay to supply the large brick, tile and terra-cotta works of Woodbridge and Perth Amboy. The road was formerly impassable in winter, having ruts hub-deep and frequent lakes of liquid clay mud. This good road is greatly appreciated by all those who can use it. An actual load of 9,200 pounds of clay has been hauled by a team over the new road since its completion. The persons using the road for heavy loads are fitting their wagons with wide tires to keep the wheels from rutting the surface.

The road from Pumptown Corner to Holly's Corner is twelve feet wide and eight inches thick, costing 72 cents per square yard; was built by J. H. Wilson; Nathan Robbins, of Metuchen, was the supervisor. The length of this road is 1 83 miles and it is used by people going between Metuchen and Plainfield.

The total amount of road work in the county to date is 23.77 miles, which have been built with the aid of the State without increasing the indebtedness of the county one dollar.

To complete a system connecting all the important towns and villages of the county, would take seventy-five miles of road, which, at the present rate, will take about twelve years. Roads are now being applied for much faster than they can be built.

Through the northern part of our county much good work has been done by the townships, and by individuals by hauling broken stone on the roads from the near-by quarries. If the county and State can fix the main thoroughfares which are subjected to heavy traffic, the less important roads can be put in passable condition at an expense not exceeding $2,500 per mile. As soon as there are good roads from the quarries the cost of the stone delivered at points in the county can be reduced. During the past year stone has been delivered at points thirteen miles from the quarries for $1.70 per ton The loads carried were never less than three, and sometimes more than four, tons. One ton would have been a good load before the roads were improved.

In the southern part of the county the soil is sandy, and at several points excellent gravel is found suitable for road improvement. The county and townships working together have built three miles of gravel road during the past year, at a cost of one-fourth the expense of a stone road under similar conditions. If these roads prove successful it will probably be the best solution of the question for the side-roads in that part of the county. Under the present practice in this county, the chief difficulty is in getting a proper grade for the roads. The county is not willing to appropriate the needed money, and expect the townships to do any extra grading which is necessary. The townships are not prepared to do as much as should be on this work, and in many places on our roads we have to do without improvement in this particular.

After one year from the date of completion of the contracts the roads have been repaired by the county. As soon as the weather permits in the spring, all ruts, hollows and worn places are filled with stone chips and three-quarter-inch stone, and rolled in, and the roads have been good after the repair the remainder of the year. A small quantity of stone is left in piles along the road for use in any small spots which may need attention during the year. Where places ravel out owing to dry weather they are covered with three-quarter-inch stone and a little loam

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Roads on a sandy foundation have cost us less for repair than those on the red clay formation.

Next year this county will build the road from Stelton to Dunellen, a distance of six miles. The road will be fourteen feet wide and eight inches thick. Also from Spotswood to Old Bridge, two and one-half miles, twelve feet wide and eight inches thick, both of macadam.

ASHER ATKINSON.

NEW BRUNSWICK, N. J., Nov. 13th, 1895.

MORRIS COUNTY.

To the Hon. Henry I. Budd, State Commissioner of Public Roads:

MY DEAR SIR—In reply to yours requesting a statement concerning the permanent improvements of highways in our county would say:

The movement for improving and paving the roads was started in the spring of 1894, when the governing body the Board of Freeholders – under the State Bonding act, passed a resolution to bond the county to the full limit under this act. The amount thus allowed and ordered raised was $350,000.

Matters shaped themselves slowly during the year, and it was not until the spring of the present year, 1895, that any work was advertised. Under this advertisement sixty-four miles of road was let. The work was to be of Telford and Macadam pavement, varying in depth from twelve inches to four inches, and in width from twelve to sixteen feet, except in some of the cities and boroughs, where it was to be paved from curb to curb. The greater part of the county being rolling lands, and the northern part hilly, the matter of grades

entered largely in the question of improvement of roads. Hence, accurate plans were drawn and great attention given to the subject of bringing the roads to easier grades. The twelve-inch pavement is to be composed of eight-inch Telford blocks and four inches of crushed stone. The ten-inch pavement of six-inch Telford blocks and four inches of Macadam stone. The four-inch Macadam pavement is to be used only in the hilly parts of the county. The prices of the work awarded range, for Telford-Macadam pavement, from forty-four to sixty-seven cents per square yard; for six-inch Macadam, from thirty-two to forty-six cents per square yard, and for the four-inch Macadam from twenty-six to thirty-four cents per square yard.

There are in Morris county fifteen townships, and work is under construction in all of them excepting Boonton township. None of the contracts have as yet been fully completed.

The direct supervision of the work is under a committee of five, appointed from the membership of the Board and the member of the Board from the township in which the work is progressing.

You will notice that the Board has started with a large mileage of highway under contract, and should soon put our county among the first of the State in the matter of improved roads.

Owing to the fact that none of the contracts are finished and that we are but beginners in the work, must be the excuse for this brief statement of our situation.

I remain yours respectfully,

WM. E. KING,
County Engineer.

CHAPTER CCIII.

An Act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; provided the said rebate shall not exced fifty cents for each wheel in use in any one year.

2. *And be it enacted*, That this act shall take effect immediately.

Approved March 16, 1893.

CHAPTER CXXXI.

An Act to enable township committees, or the governing bodies of any borough, towns, villages or improvement commissions in towns and villages, or within townships in this State, to pass and enforce their ordinances respecting the use of broad tires on wagons and carts upon their macademized public streets and to collect the penalty for the violation thereof.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That it shall be lawful for any township committee or other governing body of any borough, town, village or improvement commission to pass all necessary ordinances requiring the use of broad tires, but not more than four inches in width, upon all coal, express, lumber, brick or other draft wagons or carts, carrying fifteen hundred pounds or over, used upon any of the macadamized public streets within the limits of the jurisdiction of said township, borough, town, village or improvement commission, and to enforce the observance of such ordinances by a penalty for the violation thereof by a fine not exceeding twenty dollars for each offence; *provided, however*, that no ordinance or penalty herein authorized shall take effect until six months after the passage and publication in a newespaper circulating in said township, borough, town, village or improvement commission of such ordinance, and shall not be applicable to wagons and carts transiently passing through the limits of said township, borough, town, village or improvement commission and not owned or permanently used therein.

2. *And be it enacted*, That this act shall take effect July first, one thousand eight hundred and ninety-five.

Approved May 1, 1894.